

Review

The evolution of science and technology policy dialogue in post-colonial Africa

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This paper describes the dialogue around Science and Technology (S and T) policy in post-colonial African countries with a special emphasis on Southern Africa. It traces the evolution of S and T policy dialogue from several global and African conferences held in the 1960s. In post-colonial Africa, S and T policy dialogue was founded on the Monrovia declaration of 1979 and the Lagos Plan of Action of 1980. In the new millennium, African S and T policy dialogue has been driven by the New Partnership for Africa's Development (NEPAD). In Southern Africa, the S and T policy environment is guided by several treaties of the Common Market for Eastern and Southern Africa (COMESA) and the Southern African Development Community (SADC). Although African S and T policies are well discussed and articulated, implementation of the S and T agenda has been poor, hence the authors recommend that NEPAD institutes an S and T peer-review mechanism to monitor performance of S and T indicators in member states.

Keywords: Science and technology policy, dialogue, Africa.

INTRODUCTION

The Millennium Development Goals (MDGs), announced by former United Nations Secretary General Kofi Annan in 2000, call for the elimination or reduction of poverty and hunger, universal education, gender equality, improving the health of mothers and children, combating diseases, sustainable use of environmental resources, and development of fair and open trading regulations and global partnerships (United Nations, 2010). Here, it is contemplated that the only viable and proven way to achieve these MDGs is through the application of Science and Technology (S and T).

The role of S and T in achieving sustainable development goals was also recognized during the World Summit on Sustainable Development (WSSD) in Johannesburg, South Africa, 26 August to 4 September, 2002 (United Nations, 2002). In the Plan of Implementa-

tion, the WSSD recommended that S and T be mobilized to solve problems associated with food insecurity, energy deficiency, environmental degradation, diseases, water insecurity, and many other sustainable development challenges (NEPAD, 2005).

Despite the political rhetoric to champion the MDGs, Kasanda and Chinsebu (2009) bemoaned the lack of human development in most African countries. They stated it like this: "The satellite image of the earth at night shows Africa as a dark continent except for a few bright spots here and there. The brightest spots on the globe at night represent knowledge-based economies, such as Japan and the United States [of America], countries where the scientific enterprise is at the cutting-edge of developmental efforts" (Kasanda and Chinsebu, 2009: p.263). This comparative dichotomy between light (knowledge = development) and darkness (lack of knowledge = underdevelopment) is very serious, for two reasons. The first is personal. As Africans, the authors are personally perturbed that Africa is still a *Dark Continent*. The second reason is a challenge to African S and T to move quickly in dispensing Africa's development.

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The hope is expressed that given the correct political and socio-economic order, African higher education, research institutions, and industry will produce the much-needed scientific and technological skills for sustainable development.

Knowledge-Led Development

Going forwards, there is an unambiguous understanding among African politicians and socio-economic technocrats that knowledge is the currency for development. This understanding has been re-inspired by the new hunger for knowledge and the resurgence in the pursuit of skills the world over. All over the world, education is now variously seen as the gateway to future economic prosperity, the favoured instrument for combating unemployment, the driving force behind advancement in S and T, the essential prerequisite for peaceful and leisure-intensive societies, the spearhead of social progress, the safeguard of democratic values, and the passport to individual and national success.

Thus, education is the sole ingredient that can set the pace and shape the configuration of a country's development. In other words, education is the common denominator for sustainable development (UNESCO, 2011). It goes without saying that the best economic policy and durable investment is education. Once a person has education or knowledge, it remains with them in the form of intellectual property. Knowledge, innovation, and intellectual property are the strategic resources of any individual or society.

The power of knowledge to shape socio-economic development is also informed by the World Development Report of 1998 (World Bank, 1999). That report posited that knowledge, not capital, is the most crucial resource for economic development (World Bank, 1999). Here, the authors are also adamant that the problem of development in Africa reflects knowledge gaps especially inherent in the continent's practice and policies of S and T.

Although there is generic recognition that Africa's contours of development should be driven by S and T, rhetoric has not been matched by action (Pincock, 2006). The African S and T arena is still mired by the lack of strategic policy formulation and implementation. This scenario is compounded by the fact that details about the history of S and T policy dialogue in Africa remain scattered in several political speeches and documents. The lack of an organized body of empirical literature on the subject makes it is very difficult for S and T practitioners and educators to follow the evolution of S and T policy dialogue on the continent. Without such literature, historical remembrance and institutional memory of policy is eroded, and future policy guideposts are lost.

There can be no correct sense and bearings for

African S and T reforms without a history of the S and T agenda itself. In fact, this has been a major dilemma for the African S and T policy train because 'we cannot go further into the future if we cannot look deeper into the past'. Needless to state that the paucity of current scholarly works on the evolution of African S and T policy presents a dim historical backcloth against which today's generation of African scientists and technologists can appreciate the journey and destiny of the African S and T renaissance project. Against this backdrop, this paper is a modest effort aimed at documenting the evolution of S and T policy in post-independent Africa. Therefore, historical perspectives on the development of S and T in post-independent Africa can help illuminate the contextual background and long-range sight for advancements in S and T on the African continent. Further, the historical description will help students and practitioners to track the genesis of the S and T policy dialogue in Africa, and offer a basis upon which they can project new horizons for S and T in the future.

History of Science Policy Dialogue in Post-Colonial Africa

After many African states gained independence in the 1960s, higher education was seen as the catalyst for economic, social, and political development. This realization was later to become known as the human capital theory (Banya and Elu, 2001). At that time, economists had already realized the reciprocal relations between education and development. According to Banya and Elu (2001: p3): "educational systems would produce people with the knowledge, skills, attitudes, and values that not only were favourable to economic and social development, but were also a *sine-qua-non* for the process of national integration". As Harbison and Myers quoted by Banya and Elu (2001: p3) argued: "if a country is unable to develop its human resources, it cannot build anything else, whether it be a modern political system, a sense of national unity, or a prosperous economy".

Development Decade

The United Nations designated 1960-1970 as the *Development Decade* for developing countries, during which efforts would be made to speed up the process of modernization and unyoke the people from crippling poverty (Banya and Elu, 2001). Throughout Africa, education assumed a prominent place in the lives of the new independent states. The Conference of Ministers of Education of Independent States in Africa, held in Addis Ababa in 1961, declared education as the means by which development would take place at all levels: individual, local, regional, and national (Banya and Elu, 2001). A follow-up conference in Tananarive (now Antananarivo), Madagascar, affirmed the role of African

Universities to teach and advance knowledge through research; to train the whole person for nation building; to develop human resources for meeting labour needs; and to emphasize S and T so that the continent could produce 60% of its own doctors and agriculturalists (Banya and Elu, 2001). In African higher education, this epoch was characterised by the developmental University (Ping and Crowley, 1997).

Since the 1960s, science was embraced as the tool for modernization of the new independent African states (Odhiambo, 1967). Corollary, three international conferences were held: the International Conference on Science in Advancement of New States, held in August 1960, at the Weizmann Institute of Science, Rehovoth, Israel; the United Nations Conference on the Application of S and T for the Benefit of the Less Developed Areas, held in February 1963 in Geneva; and the International Conference on the Organization of Research and Training in Africa in Relation to the Study, Conservation, and Utilization of Natural Resources held in July 1964 in Lagos, Nigeria (Odhiambo, 1967). All these conferences underlined the need to use science as a tool to dissolve Africa's economic and social problems (Odhiambo, 1967).

The Monrovia Declaration

Thus, following a series of in-depth considerations of the economic problems and stagnation of the continent by African Ministers and by groups of experts, the Heads of State and Government of the OAU adopted at their 16th Ordinary Session, held in Monrovia, Liberia, 17 to 20 July 1979, the "Monrovia Declaration of commitment" for national and collective self-reliance in economic and social development. The Monrovia Declaration stated as follows: "recognizing the need to take urgent action to provide the political support necessary for the success of measures to achieve the goals of rapid self-reliance and self-sustaining development and economic growth... we commit ourselves, individually and collectively, on behalf of our governments and peoples...to put S and T in the service of development by reinforcing autonomous capacity of our countries in this field" (Organization of African Unity, 1979: p.4).

The United Nations Conference on Science and Technology for Development

The United Nations (UN) General Assembly in May 1974 made a Declaration and a Programme of Action for the Establishment of a New International Economic Order which would give prominence to the role of S and T in promoting the development of developing countries. Between 16 September 1975 and 4 August 1978, the UN General Assembly passed several resolutions related to

the convening and preparation of the UN Conference on Science and Technology for Development (UNCSTD). This was because the UN was convinced of the paramount need for the application of S and T to development, especially in establishing a new international economic order.

The General Assembly felt that effective measures in the field of real disarmament would increase the possibilities of realigning resources which were being used for military purposes to economic and social development. Thus, the UN emphasized the urgent need to develop and strengthen the scientific and technological capacities of developing countries in order to enable them to apply S and T to their own development challenges, with a view to eliminate existing inequalities between developing and developed countries in S and T.

After a long gestation period, the UNCSTD finally took place in Vienna, Austria, between 20 and 31 August, 1979. The overall expenditures for this Vienna held conference were estimated at some US \$50 million (Kaplan, 1979). Despite the gigantic costs, there were no dramatic results from the UNCSTD (Kaplan, 1979). However, the UNCSTD reached some compromise agreement on the following main points: a global information system, and governing principles for the transfer of technology; institutional arrangements, particularly within the United Nations system, which would ensure a high status for an Intergovernmental Committee on S and T for development; and automatically renewable financing to be supplied primarily by the industrialized countries to implement the Vienna Plan of Action. Arguments concerning these points occupied two committees for ten working days of the conference.

The Lagos Plan of Action

In April 1980, African leaders and technocrats met in Lagos, Nigeria, to draft the Lagos Plan of Action (LPA). This was because African leaders and technocrats were displeased with the results and programmes of the UNCSTD held in Vienna. The frustrations of the African Heads of State and Government were encapsulated in the following quotations: "The outcome of the UNCSTD was not effective and fruitful as anticipated" and the "Vienna Programme of Action leaves much to be desired," stated the LPA document (Organization of African Unity, 1980: p.34). Contrary to the UNCSTD's resolutions for Africa, the LPA was a more visionary, far-reaching and unprecedented blueprint on how to foster collective self-reliance and sustainable development in Africa (NEPAD, 2006).

The LPA consists of 13 chapters including, among other issues, food and agriculture, industry, natural resources, human resource development, S and T, transport and communication, trade and finance, environ-

ment and development, and energy. It was founded in the conviction that Africa's underdevelopment was not inevitable. Indeed, the LPA noted that it is a paradox that Africa is poor given the immense human and natural resources of the continent.

The LPA states as follows: "The importance of scientific and technical skills and know-how for modern development cannot be over-emphasized. It is in this area that Member States are over-dependent on imported technical and scientific manpower. It is therefore very cardinal, and in accordance with the principle of self-reliance, that Member States should give special priority to the development of scientific and technical manpower at all levels, including the training of science and technical teachers and instructors" (Organization of African Unity, 1980: p.28).

According to the LPA: "Top priority should be given to the development of human resources for the creation of S and T infrastructure of manpower, knowledge-skills, innovation and productive capacities to absorb and adapt imported technology, on the one hand and, on the other, to develop technology locally for the identification, exploration and exploitation of natural resources, and the conversion of raw materials into semi-finished and finished goods and products" (Organization of African Unity, 1980: p.38).

The LPA also implored that "Member States should take steps to improve existing and create new funding mechanisms to provide funds on a predictable and continuous basis at the national level, with a view to substantially increasing the resources available for the development of their scientific and technological capabilities and to the implementation of the Programme of Action. Member States are urged, within the coming decade, to aim at gradually reaching the target of mobilizing, at the domestic level, 1 per cent of their GDP (Gross Domestic Product) for the development of their scientific and technological capabilities" (Organization of African Unity, 1980: p.52).

Science and Technology policy dialogue in the NEPAD era

Under the New Partnership for Africa's Development (NEPAD), an economic programme of the African Union (AU), S and T have been acknowledged as the main drivers of economic growth and development (Mugabe, 2006). The ability of countries to create, distribute and utilize scientific and technological knowledge is now accepted as a major determinant of their competitiveness in the global economy (NEPAD, 2003). Countries with a greater ability to use S and T are more likely to improve their people's quality of life. Thus, there is an explicit correlation between a country's scientific and technological status and its economic performance and affluence, and indeed the divide between poor and rich

countries in terms of real income and human development is determined largely by differences in the accumulation and utilization of S and T (NEPAD, 2003).

Closing the gap between the poor and rich countries will require deliberate interventions to build scientific and technological capacity of the poor countries (NEPAD, 2003). Indeed NEPAD has recognized that Africa's transition to sustainable development will have to be underwritten by the application of S and T to solve the pressing problems of food production, disease, energy insecurity, communication, and environmental degradation (NEPAD, 2003).

Africa's scientific and technological capacity is also recognized as the crucial switch for the continent to achieve the Millennium Development Goals, and the gateway into the global knowledge economy and society (NEPAD, 2005). This is echoed in most of the political agreements signed at continental and regional levels. For example, the Commission for Africa 2005 report identified science, engineering, and technology as the imperatives that would strengthen Africa's capacity to identify local solutions to local problems (NEPAD, 2005). The Commission stated that S and T were prerequisites to innovation and accelerated economic growth.

Further, the first African Ministerial Conference on Science and Technology (AMCOST), held in Johannesburg in November 2003, adopted twelve flagship areas that would be developed into concrete scientific research and development programmes for implementation (NEPAD, 2005). AMCOST is a high-level platform for developing policies and setting priorities on science, technology and innovation for African development. AMCOST provides political and policy leadership for the implementation of Africa's Science and Technology Consolidated Plan of Action (CPA). The CPA was adopted by the second conference of AMCOST in Dakar, Senegal on 30 September 2005, and endorsed by the AU Summit from 16-21 January 2006 (African Union, 2006). The CPA is built around three S and T themes: capacity building, knowledge production, and technological innovation (NEPAD, 2006). In 2007, S and T reached the political climax in Africa. At the AMCOST meeting of 12-16 November 2007, in Mombasa, Kenya, Heads of Government again pledged to increase their spending to 1% of their countries' GDP (African Union, 2007a). In 2007, South Africa spent 0.87% of her GDP on S and T while most sub-Saharan African countries spent an average of 0.3%. To-date, this scenario has not significantly changed at all.

At an extra-ordinary conference of AMCOST in Cairo, Egypt held between 23-24 November, 2006, African ministers of S and T again committed themselves to the 'Cairo declaration' aimed at establishing mechanisms that accelerate and monitor the implementation of the CPA; working together to develop a 20 year African Biotechnology Strategy and harmonize national and regional regulations that promote the application and

Safe use of modern biotechnology; promoting research and development and developing innovation strategies for wealth creation and economic development; and popularizing the importance of S and T for the development of African countries (African Union, 2007b).

Science and Technology policy dialogue in the COMESA region

Africa's regional economic integration Agreements also stress the importance of countries to cooperate in the fields of S and T development. Articles 103, 104 and 127 of the Treaty that established the Common Market for Eastern and Southern Africa (COMESA) are dedicated to S and T cooperation (NEPAD, 2003). In 2010, the COMESA summit was held under the theme "harnessing science and technology for development". That summit promised to concretize mechanisms for leveraging S and T to address the key development priorities in the region; establish databases to identify individuals with the right profiles that can assist the implementation of S and T initiatives in COMESA; harmonize and coordinate policy frameworks on S and T at the COMESA level; and adopt master plans to advance technological knowledge, and mobilize the required resources for S and T. Despite these eloquent objectives, there has been no coherent and calculated action towards S and T reforms and programme implementation in the COMESA region.

Science and Technology policy dialogue in the SADC region

Article 21 of the Treaty which established the Southern African Development Community (SADC) aims at promoting cooperation in S and T (NEPAD, 2003). The Regional Indicative Strategic Development Plan (RISDP) spells out the general strategy for the SADC region. Chapter 4 of the RISDP calls for the strengthening of regional cooperation in the area of S and T; development and harmonization of S and T policies; increased research capacity in key areas; technology development, transfer and diffusion; and public understanding of S and T (Mpanza, 2011).

Several meetings have taken place at the SADC level, among them, a meeting of UNESCO and Heads of S and T in the SADC Region in Roodevalei, Pretoria, South Africa, 20-21 April, 1999. The theme of the Roodevalei meeting was S and T in the SADC region for the 21st Century. In July 2007, twelve S and T ministers from SADC signed a Protocol in Pretoria, South Africa, to improve S and T cooperation. The Protocol aims to align S and T programmes with those contained in NEPAD's CPA. Article 6 of the Protocol also makes provisions for

cooperation in S and T. Other provisions of the Protocol: the development of a regional S and T policy; determination of common priority S and T areas; development of joint research facilities and sophisticated equipment; establishment of regional centers of excellence; development of monitoring and assessment mechanisms for advancements in S and T; and the free movement of S and T researchers in the region. In December 2008, SADC ministers responsible for S and T met in Gaborone, Botswana, to establish an office or unit within the SADC headquarters that would coordinate S and T activities in member states (DST, 2008).

Science and Technology policy dialogue by the Civil Society

Apart from government initiatives, there has also been a push for science-led development from scientists themselves. For example, the idea to start an Africa-wide Academy of Sciences was hatched during the inaugural meeting of the Third World Academy of Sciences (TWAS) in Trieste, Italy, 5-10 July, 1985 (African Academy of Sciences, 2010). The first meeting of the Academy of African Sciences (AAS) was convened in Nairobi, Kenya, 3-6 June, 1986 (African Academy of Sciences, 2010).

The AAS initiated consultations and negotiations that led to the establishment in 1992 of the Research and Development Forum for Science-led Development in Africa (RANDFORUM), an organ for coordinating consultations on science and technology-led development on the continent (RANDFORUM, 1994). RANDFORUM spearheaded the creation of the Presidential Forum on the Management of Science and Technology for Development in Africa, a top-level and continent-wide periodic consultation summit on S and T-led development. Heads of state and government, S and T advisors, leaders of business and industry, the S and T community, and the academia attended the Presidential Forum. The Presidential Forum conducted problem-solving discussions, with RANDFORUM coordinating the follow-up actions on decisions made. RANDFORUM conducted Presidential Forum sessions in Maputo (Mozambique) in 1992, Abuja (Nigeria) in 1993, and Kampala (Uganda) in 1994. Each of these sessions attracted at least six African Presidents and their senior advisors. The key resource person in all the sessions was the former President of Nigeria, General Olusegun Obasanjo. Although RANDFORUM drew enormous high-level political support for science-led development on the continent, its current moribund state is largely attributed to the passing away of its founder and leader, Professor Thomas Odhiambo, who also founded and headed the International Centre for Insect Physiology and Ecology in Nairobi, Kenya.

CONCLUSION AND RECOMMENDATIONS

S and T policy dialogue in post-colonial African states has been undertaken through many conferences of Heads of Governments, ministers, and technocrats. Many treaties, declarations, and pledges have been passed regarding the advancement of S and T in Africa in general and Southern Africa in particular. In the main, S and T policy dialogue has been marked by more rhetoric than action. Many countries have not implemented the policy of apportioning 1% of their GDP to S and T. Thus, despite the many excellent policies on paper, S and T initiatives in Africa remain unimplemented, and monetary subventions to S and T in most sub-Saharan African countries are still below 1% of the GDP. Lack of implementation of the S and T policy agenda, especially the LPA and the CPA, is the major reason why African economies lag behind in terms of socio-economic development. Suffice to state that 'failing to implement good S and T policies is as good as implementing failed S and T policies'.

Here, it is recommended that African S and T policy makers and practitioners should revisit and implement the noble vision encapsulated in the Lagos Plan of Action and the NEPAD CPA. It is also recommended that the African Union and the new NEPAD Agency should institute a compulsory peer-review mechanism to monitor and urge the performance of S and T indicators in all African countries. This mechanism can take the form of the African Peer Review Mechanism (APRM), a mutually agreed instrument that encourages conformity to political, economic and corporate governance values, codes and standards. The monitoring mechanism is urgent given the dire need for S and T-development on the continent.

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